



Operating instructions SPL Tools S1, extender and weather protection

Version 1.0



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Introduction and overview

With the SPL Tools S1, you get a high-quality measurement sensor for sound level measurement at events and in the industrial and construction sectors. With the free SPL Sense software, you can visualize and record measured values. Measurement data can also be transferred to the SPL Cloud with SPL Sense. Find out more at spl.swiss. The SPL Tools S1 measuring system consists of the measuring sensor, the mounting clamp, the windscreen, a 4m long connection cable to USB-A, and a practical transport case. The optionally available extenders can also be stored in the transport case.

Hardware overview



Sensor S1



Wind screen



Mounting clamp



Connection cable
XLR -> USB Typ A 4m



Transportcase



Extender (optional)



Weather protection (optional)

Safety instructions and disposal



The sensor may only be operated on suitable USB power sources with 5V, 100mA DC. The original connection cables must also be used exclusively. A network cable of type Cat.6a SFTP with a maximum length of 30 m must be used for the connection between the extender pair.

Overvoltage category 2



All hardware components must not be disposed of with household waste. The components must be handed over to a collection point for electrical recycling in accordance with local regulations.

The measuring sensor and all accessories must be used exclusively for sound level measurement in a professional environment. Excessive sound pressure levels can cause harm to people or animals. The plausibility of the measured values must be checked by the user. SPL Cloud GmbH accepts no liability for sound pressure levels exceeding the limit values or for damage caused by measurement errors or incorrect display values.

The measuring sensor and all accessories must be protected from the effects of weather such as water, wind, direct sunlight, mechanical influences and dirt. The listed influences can lead to permanent damage to the measuring device or incorrect measurement data.

Ambient temperature: -10°C - 50°C

Relative humidity: 10% - 90% non-condensing

Static air pressure: 650 hPa - 1060 hPa

For outdoor use, the sensor must be protected with the original weather protection. The original weather protection does not guarantee protection against damage caused by the effects described.

All components may only be cleaned with a dry cloth without solvents.

Defective parts or components must be replaced. Only original spare parts should be used. Defects in individual parts can lead to consequential damage to the measuring system or to incorrect measurement data.

Only original brackets shall be used for installation. The components must be secured when installed above or next to people in accordance with the relevant legal requirements.

Additionally, information in the "Technical data sheet" (in the appendix) must be observed.

Connection to the PC

The SPL Tools S1 measuring sensor is connected to the PC using the USB connection cable supplied. The installation of drivers is not necessary. The measurement sensor registers as a microphone (audio signal) and as a serial device on the PC. If the 4m connection cable is not long enough, we recommend using the SPL Tools Extender. The 24bit audio signal can be recorded, displayed or analyzed in any software. The finished measured values, which are transferred from the sensor to the PC, can be displayed and recorded using the SPL Sense software. SPL Sense runs on the macOS and Windows operating systems. A version with browser access is available for embedded Linux. The current versions and their system requirements can be found on spl.swiss. For integration into an OEM system instead of SPL Sense, please contact spl.swiss

Measurement

When positioning the sensor, both acoustic and environmental influences must be taken into account. The sensor must be protected from water, wind and mechanical influences. These influences can lead to unusable readings and damage to the sensor. First, the measuring sensor should be positioned using the sensor holder or weather protection and connected to the PC. The measured values can now be displayed in SPL Sense. SPL Sense also shows whether calibration by an SPL Cloud GmbH service center is necessary. The next step is to check the function of the sensor using a suitable calibrator. If the desired measured value is displayed with the calibrator attached, the measurement can be started. Depending on the area of application, different measuring locations must be selected, and limit values observed. The applicable legal regulations and requirements must be observed. For measurements in the vicinity of events in Switzerland, the relevant information at <https://www.bag.admin.ch/schall> in the document "Industry recommendation for the measurement procedure" and the "V-NISSG" must be observed.

Calibration

Manufacturer calibration

The sensor was tested and calibrated as part of the quality assurance process. The calibration report is included in the scope of delivery. SPL Sense shows whether the calibration is still valid. We recommend having the device recalibrated after one year. This is done by SPL Cloud GmbH or our distributors and service centers. During this process, all functions of the product are checked, and a calibration is carried out.

Calibration check by the user

The manufacturer's calibration does not replace the user checking the calibration before and after a measurement. We recommend using a calibrator with 94dB or 114dB @1kHz (such as the Nor1256 from Norsonic).

Signature

The device information and the calibration of the device are digitally signed by the calibration laboratory. This creates a key with which the sensor's measured values are digitally signed. This means that even after the measurement, it can be ensured that the measured values were recorded with a currently calibrated sensor and have not been changed.

Extender

The SPL Tools USB extender enables the measurement sensor to be remotely located up to 30 m away using a Cat.6a SFTP cable. With the interlocked plug connections, it is optimally matched to the measuring sensor. An additional power supply is not required. We recommend using only the original SPL Tools extender to guarantee the function of the measurement sensor and to prevent damage to it. Depending on the network cable used, the maximum possible length may be significantly restricted. The use of the extender on low-power USB ports, such as tablets and smartphones, is not recommended due to the power consumption.

Connecting the extender

1. Plug the measuring sensor directly onto the device extender.
2. Connect the extender with the network cable.
3. Connect the host extender to the PC using the original connection cable.



Weather protection

The weather protection protects the sensor from rain and wind. When using the weather protection, the corresponding filter must be activated using SPL Sense. Measurement errors occur if the filter setting is incorrect. If it rains heavily and the windscreen fills with water, non-frequency-linear attenuation of the sound pressure level may occur.

Mounting the weather protection on the sensor

1. Insert the connection cable into the weather protection.



2. Screw on the housing and fix the lower cover with the 2 Allen screws.



3. Plug the sensor into the connection cable.

4. Attach the microphone adapter to the measuring sensor using the mounting aid and place the sealing ring on the sensor from the front.



5. Fit the acoustic coupler with integrated moisture protection. Make sure that the moisture protection is not pushed back into the acoustic coupler.



6. Fit the draft shield and the screw-on cover.



Firmware

The basic measured values with A, C and Z filters are calculated in the sensor and transferred to SPL Sense. This means that software updates that extend the range of functions are only necessary in the SPL Sense software. Firmware updates of the sensor can only be carried out by a service center of SPL Cloud GmbH.

Registration

We recommend registering the S1 sensor on spl.swiss. After registration, you will have access to our calibration service. We will also keep you up to date with updates and adjustments.

Warranty, repair and service

In the event of a defect, please contact your seller or distributor. Further information can be found under Distribution on spl.swiss.

SPL Cloud GmbH guarantees the function of the products in compliance with the information in the user manual for two years from the date of sale. Within this period, the products will be repaired or replaced free of charge.

Impacts, moisture, high humidity, accidents, improper transportation, incorrect use, use of non-original accessories, mechanical manipulation, attempts to access the firmware or data stored on the sensor can permanently damage the device. This damage is not covered by our warranty. Repairs, calibrations and firmware adjustments may only be carried out by SPL Cloud GmbH or by service centers certified by SPL Cloud GmbH.

Our warranty is independent of nationally applicable laws and does not restrict them. You can assert any applicable statutory rights at your own discretion.

Attachments

CE Declaration of Conformity

SPL Cloud GmbH, Rosgartenstrasse 28, 8280 Kreuzlingen, states that the SPL Tools S1 measuring sensor, extender, weather protection and other accessories have been tested in accordance with the following standards:

- Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- Directive 2012/19/EU on the reduction of the increasing amount of electronic waste (WEEE)
- DIN EN 61672-1:2014-07
- EN 61326-1
- V-NISSG

This declaration is invalid if changes are made to the devices without the written approval of SPL Cloud GmbH.

Place; Date: Kreuzlingen; 01.11.2022

Two handwritten signatures in black ink, one on the left and one on the right, representing the members of the Executive Board.

Members of the Executive Board

Technical data sheet

SPL Tools S1

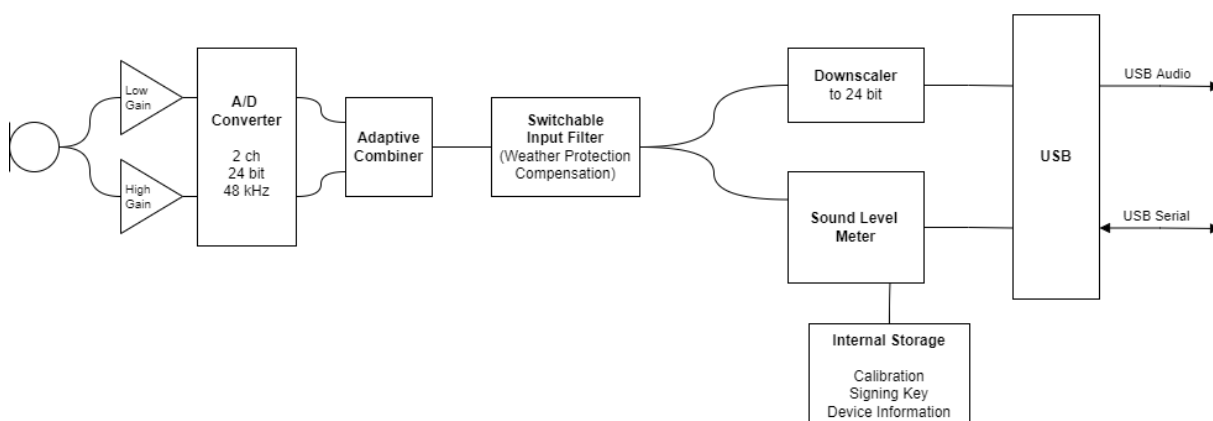


General

The SPL Tools S1 is an omnidirectional measurement microphone (class 2 frequency response) combined with an integrated sound pressure level meter.

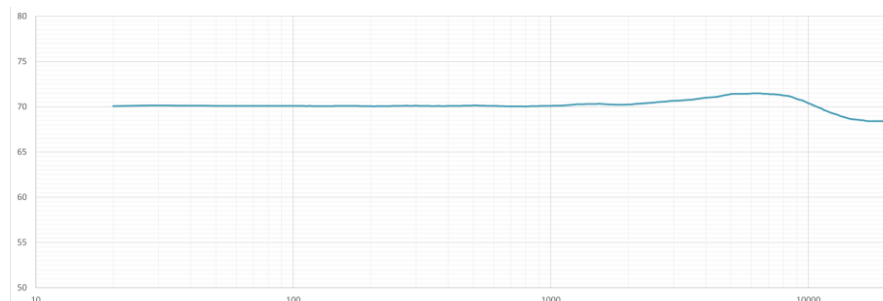
The device can be used simultaneously as a USB measurement microphone and as a calibrated SPL meter. Due to its internal two channel architecture, the full dynamic range can be used without manual switching. The internal sound level meter operates on the full resolution of the combined audio channels using 32-bit float arithmetic. To ensure audio class compatibility, the audio signal is presented as 24-bit fixed on the USB audio endpoint. The measured values can be displayed and recorded using the SPL Sense software. The audio signal can be used for measurement software or for recording.

The calibration used to calculate dB SPL values is stored internally together with key material to ensure measure value integrity.



Directional Characteristic
Noise
Dynamic Range
Frequency Response

Omni-direktional
<35dBA
30dBA – 135dBZ



Determined using 10 different devices in a calibrated, anechoic chamber.

USB Audio

Driver	USB Audio Class 1.0 compatible (No additional drivers needed for Windows 10 and Mac OS X)
Samplingrate	48kHz
Bit depth	24bit

USB Serial Measurement Data (with SPL Sense or own Software)

Measured sound pressure level data can be received over the built in USB serial endpoint. The following data packets can be activated or deactivated on the interface:

FValue (every 125ms)

- A, C and Z weighted, fast (LFA, LFC, LFZ)
- 1/3rd octave spectral values (31 bands)

Tick (every 1s)

- A, C and Z weighted levels, leq integrated over 1s (Leq 1s A, Leq 1s C, Leq 1s Z)
- A, C and Z weighted highest fast levels within the last 1s (MaxF 1s A, MaxF 1s C, MaxF 1s Z)
- 1/3rd octave spectral values (31 bands), Leq-integrated over 1s, FFT size 4096 with hann window
- 1/3rd octave highest fast levels (31 bands) , FFT size 4096 with hann window
- Clip / Low / Healthcheck flags

Interval (every 1min, can be aligned to the system clock of the host system)

- A, C and Z weighted level, leq integrated over 60s (Leq 60s A, Leq 60s C, Leq 60s Z)
- A, C and Z weighted highest fast level within the last 60s (MaxF 60s A, MaxF 60s C, MaxF 60s Z)
- 1/3rd octave spectral values (31 bands), Leq-integrated over 60s, FFT size 4096 with hann window
- 1/3rd octave highest fast level (31 bands) within the last 60s, FFT size 4096 with hann window
- Clip / Low / Healthcheck flags (temperature too high, voltage too low)
- digital signature (over blocks of 15 intervals) ensuring the integrity of the measured intervals and the validity of the sensor calibration.

Please contact us for a detailed interface specification or a prepared library for your OEM integration.

Data Integrity

To ensure data integrity, the interval packets are digitally signed before transmission using a digital certificate. This certificate is generated when the sensor is calibrated and valid as long as the calibration is valid.

When the host application (e.g. SPL Sense) stores the signatures, the validity of the recorded measure values und the sensor calibration can be verified after recording the data.

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Scope of delivery

- SPL Tools S1
- 4m USB type A to XLR 4 pin cable
- Mounting clamp
- Case with zipper

Dimensions

SPL Tools S1

Length	143mm
Rear diameter	19mm (3/4")
Front (Capsule) diameter	13mm (1/2")
Weight	56g

Transport Case

Width	26cm
Height	7cm
Depth	8cm
Weight	405g (including S1, cable and clamp)

Additional information

Power	5V / 100mA
USB	USB 2.0 Full speed
Color	black
Material (S1)	metal
Conformity and standards	CE, RoHS
	In accordance with DIN EN 61672-1:2014-07 and EN 61326-1